

Agriculture and Forestry Technical Work Group

Draft Policy Option: A1a. Manure Management - Manure Digesters

1. Policy Description:

- a. Lay description of proposed policy action: *Reduce CH₄ emissions from livestock manure through the use of manure digesters installed at dairies. Energy from the manure digesters is used to create heat or power, which offsets fossil fuel-based energy production and associated CO₂ and black carbon emissions.*

Are dairy lagoons the only sources that can be covered by this measure? E.g. can digesters be applied at feedlots?

b. Policy Design Parameters:

- i. Implementation level(s) beyond BAU: *Describe any existing manure digester operations in AZ, including the number of head of dairy cattle.*
 - ii. Timing of implementation: *Head of dairy and feedlot cattle affected from 2006-2020, including head of cattle affected in 2010, 2020 and 2050.*
 - iii. Implementing parties: *Dependent upon implementation mechanism below. Likely to include owners of livestock operations, Arizona Corporation Commission, energy companies, university or cooperative extension office, and state government grant authorities.*
 - iv. Other
- c. Implementation Mechanism(s): Indicate which mechanisms are to be used, and describe the specific approach that is proposed
- i. Information and education - X
 - ii. Technical assistance - X
 - iii. Funding mechanisms and or incentives - X
 - iv. Voluntary and or negotiated agreements
 - v. Codes and standards - X
 - vi. Market based mechanisms
 - vii. Pilots and demos - X
 - viii. Research and development - X
 - ix. Reporting

- x. Registry
- xi. Other?

2. BAU Policies/Programs, if applicable:

What we need to specify here are any existing programs that affect manure management and subsequent emissions. These don't have to be air-related programs. If the policy can only be implemented at dairy anaerobic lagoons, then we should be specific to any existing programs for these sources. Are there existing incentives?

- a. Description of policy/program #1 -
- b. Etc.

3. Types(s) of GHG Benefit(s):

- a. CO₂: *Use of methane captured in manure digesters to generate electricity displaces fossil fuel use and associated CO₂.*
- b. CH₄: *Manure digesters collect and combust the CH₄ produced from anaerobic decomposition during manure storage.*
- c. N₂O: *N₂O emissions from manure management are not likely to be affected by this policy option. N₂O emissions from fossil fuel-based electricity will be offset.*
- d. HFC's, SFC's
- e. Black Carbon: *Use of methane captured in manure digesters to generate electricity displaces fossil fuel use and associated BC emissions.*

4. Types of Ancillary Benefits and or Costs, if applicable:

- a. *Reduction of ammonia, VOC emissions, and odor.*
- b. *Reduction of fossil fuel-based energy consumption.*
- c. *Could enhance the value of manure through higher demand for manure overall and potentially higher quality of digested manure.*

5. Estimated GHG Savings and Costs Per MMTCO₂e:

- a. Summary Table of:
 - i. GHG reduction potential in 2012, 2020, 2050
 - ii. Net Cost per MMTCO₂e in 2012, 2020, 2050
- b. Insert Excel Worksheet showing summary GHG reduction potential and net cost

6. Data Sources, Methods and Assumptions:

- a. Data Sources
- b. Quantification Methods
- c. Key Assumptions

7. Key Uncertainties if applicable:

- a. Benefits
- b. Costs

8. Description of Ancillary Benefits and Costs, if applicable:

- a. Description of issue #1
- b. Description issue #2
- c. Etc.

9. Description of Feasibility Issues, if applicable:

- a. In the U.S. about 7% of greenhouse gas emissions are from agriculture, with the major source of agricultural emissions being nitrous oxide from agricultural soils. About 25% of agricultural emissions come from waste management activities and about 25% from enteric fermentation. We have a lot of interest in developing domestic energy sources, especially in rural areas where electricity is more difficult and expensive to obtain. We would like to focus on making some of these technologies more affordable (e.g., high initial cost of anaerobic digesters compared to other management methods).
- b. Need to identify methods for integrating this form of distributed power into the power grid in AZ.
- c. Etc.

10. Status of Group Approval:

- a. Pending
- b. Completed

11. Level of Group Support:

- a. Unanimous Consent
- b. Supermajority
- c. Majority
- d. Minority

12. Barriers to consensus, if applicable (less than unanimous consent):

- a. Description of barrier #1
- b. Description of barrier #2
- c. Etc.